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# Guide to Protected Species

This guide looks at the interactions between protected species and fisheries, providing information on potential mitigation options

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## Summary

This Guide introduces and discusses the definitions of protected species and their interactions with commercial fisheries activities. Given the increased consumer expectations for sustainably and responsibly sourced foods, the need for effective fishing gear selectivity, aimed at reducing the capture of protected species, as well as non-target catches, are important ongoing issues for the wider UK seafood supply chain. Effective measures to mitigate protected species bycatch<sup>1</sup> are central to industry reputation as part of its so-called 'social license'<sup>2</sup> to operate.

Protected or sensitive species include all species officially protected under a wide range of international conventions and legislation. These are defined as species which:

- are legally protected;
- their populations are considered vulnerable as assessed by the International Union for Conservation of Nature (IUCN) [Red List](#); or
- may be considered vulnerable to the effects of fishing activities because of low abundance or their life history characteristics mean a population can withstand limited additional mortality.

The legislative and policy drivers for conservation of these species are discussed at a global, national and regional level. An important theme is that fisheries should minimise their effects on protected species through appropriate measures to monitor and reduce bycatch.

The UK Bycatch Monitoring Programme (BMP) provides dedicated protected species monitoring for some sectors of the UK fleet. The data are analysed and reported at both the UK level and also internationally via the International Council for the Exploration of the Sea's ([ICES](#)) working groups, who conduct assessments of bycatch levels for protected species. These assessments are typically determined by comparing bycatch estimates against accepted thresholds, or reference points, to determine whether the levels for a given population are of conservation concern.

Measures to reduce bycatch of protected species of marine mammals, seabirds, turtles and protected fish (including sharks, skates and rays) are described by gear type in UK and Northwest European fisheries.

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<sup>1</sup>Fishers sometimes catch animals they do not want, cannot sell or are not allowed to keep. This is collectively known as 'bycatch'. Bycatch can be fish (e.g. undersized individuals, egg-laden females, or non-target species), but also includes other animals such as dolphins, turtles and seabirds that become hooked or entangled in fishing gear.

<sup>2</sup> The term 'social license' is becoming a popular expression to describe the level of acceptance, or approval, by local communities and stakeholders of organisations and their operations.

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## Glossary of Acronyms

Term	Definition
ALDFG	Abandoned, Lost or otherwise Discarded Fishing Gear
ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic, Northeast Atlantic, Irish and North Seas
BMI	Bycatch Mitigation Initiative
BMP	UK Bycatch Monitoring Programme
CMS	Convention on Migratory Species (or Bonn Convention)
CSIP	UK Cetacean Stranding Investigation Programme
DAERA	Department of Agriculture, Environment and Rural Affairs (Northern Ireland)
DEFRA	Department for Environment, Food and Rural Affairs
ETP	Endangered, Threatened and Protected species
FAO	Food and Agricultural Organization of the United Nations
GES	Good Environmental Status
GWERN	Global Whale Entanglement Network
ICES	International Council for the Exploration of the Sea
IUCN	International Union for Conservation of Nature
IWC	International Whaling Commission
LED	Light emitting diode
MARPOL	International Convention for the Prevention of Pollution from Ships
MMO	Marine Management Organisation
MPA	Marine Protected Area
OSPAR	Commission of the Convention for the Protection of the Marine Environment of the North-East Atlantic. Tasked with implementing the Marine Strategy Framework Directive within the EU and developing indicators for GES regionally.
PBR	Potential Biological Removal
PET	Protected, Endangered or Threatened species
POA	Plan of Action
SAC	Special Area of Conservation. MPAs designed for protected non-avian species and habitats
SEFRA	Spatially Explicit Fisheries Risk Assessment
SPA	Special Protection Area: MPA designed for protected bird species
SMASS	Scottish Marine Animal Stranding Scheme
TAC	Total Allowable Catch
UNCLOS	United Nations Convention on the Law of the Sea

## 1 Introduction

A variety of human activities are known to impact protected species including pollution, offshore development, underwater noise and habitat loss or degradation. However, the accidental capture in fishing gear of animal species (bycatch) is acknowledged to be one of the most extensive global threats to the conservation status of many species.

The purpose of this Guide is to provide general information on protected species and their interactions with activities in UK fisheries. The bycatch of protected species is known to occur in most fisheries, although the species impacted and the overall level of bycatch varies widely between fisheries.

Aside from any legal requirements, for fishers, avoiding bycatch is important for several reasons. Minimising the wider environmental effects of fisheries has become important from an ecological and ethical standpoint, and this can also be reflected in fish market access and reputational issues. There can also be significant economic costs to fishers, due to the time taken to remove bycaught species, repair damaged gear and, potentially, subsequent loss of catch. Bycatch can also pose a safety issue for fishers when clearing large animals from gear. Consequently, bycatch can impact the sustainability of our fisheries, both from species conservation and industry operational perspectives.

## 2 Definitions

Protected species include all species officially protected under a wide range of international conventions and legislation. For example, all species of whales, dolphins and porpoises (known collectively as cetaceans), and all seabird species are included. Sea turtles including the leatherback turtle (*Dermakelys coriacea*), which is a fairly regular visitor to UK waters, are also protected. Protected species may also be referred to as either Endangered, Threatened and Protected (ETP) species or Protected, Endangered or Threatened (PET) species.

Sometimes the term 'sensitive species' is also used. This includes species that are not protected by national or international legislation but which are considered particularly sensitive to the effects of fishing activities. This may be due to low abundance or because their life-history characteristics mean a population can only withstand limited additional mortality. For example, species listed as vulnerable, endangered or critically endangered by the International Union for Conservation of Nature ([IUCN](#)), and placed on its [Red List](#), are normally included within the protected or sensitive species definition. However, the IUCN listing does not, of itself confer protection, but can be used as evidence for conservation policies.

Various fish species are also classed as protected, although the listing is more complex. There is no single accepted definition of what constitutes endangered or threatened status for fish and, notably, some protected or sensitive fish species are also of commercial interest.

This leads to complex issues and trade-offs between conservation ambitions which can impact the livelihoods of fishers. Protected fish species include: teleosts (bony fish) such as cod (*Gadus morhua*), European sturgeon (*Acipenser sturio*), and long snouted seahorse (*Hippocampus guttulatus*); as well as elasmobranchs (sharks, skates and rays) such as basking shark (*Cetorhinus maximus*), angel shark (*Squatina squatina*), and porbeagle shark (*Lamna nasus*).

Examples of IUCN Red List fish species present in UK waters, together with their status, include shortfin mako shark (*Isurus oxyrinchus*, endangered), starry ray (*Amblyraja radiata*, vulnerable), tope (*Galeorhinus galeus*, vulnerable), spurdog (*Squalus acanthias*, vulnerable), flapper skate (*Dipturus intermedia*, critically endangered) and the common or blue skate (*Dipturus batis*, critically endangered). These latter two species are often referred to together as the 'common skate complex' in bycatch monitoring, since it is only recently that the two species have been recognised.



Figure 1: Common dolphins (©Nick Tregenza) and basking shark (©Andrew Pearson)

### 3 Legislative and policy drivers

Legislative and policy drivers operate at UK national, regional and global levels.

#### 3.1 Fisheries Act 2020

The [Fisheries Act](#) makes provisions relating to fisheries, fishing, aquaculture and marine conservation. The Act has six environmental objectives, including the 'ecosystems objective' which states that "*incidental catches of sensitive species are minimised and, where possible, eliminated.*"

#### 3.2 Marine and Coastal Access Act 2009

The Marine and Coastal Access Act ([MCAA](#)) makes provisions for the designation of Marine Conservation Zones (MCZs) in English waters for the protection of certain species and habitats.

#### 3.3 [Sea Fish \(Conservation\) Act 1967](#), [Fisheries Act 1981](#), [Sea Fisheries \(Wildlife Conservation\) Act 1992](#), [Environment Act 1995](#)

These Acts give Ministers powers to regulate fisheries' management and to restrict fishing for marine environmental reasons, defined as:

- conserving or enhancing the natural beauty or amenity of marine or coastal areas or any features of archaeological or historic interest; or
- conserving flora and fauna in the marine or coastal environment. Devolved Administrations have legislation that provides similar powers to regulate fishing within their waters.

#### 3.4 Environment Act 2021

The [Environment Act](#) contains a general duty to conserve and enhance biodiversity in the marine environment which incorporates all protected species.

### 3.5 Twenty-Five Year Environment Plan

This [Plan](#), specific to England, aspires to “a world-class fisheries management system” and “to restore and protect the marine ecosystem” where “an ecosystem approach to fisheries management will account for, and seek to minimise, impacts on non-commercial species”.

### 3.6 UK Dolphin and Porpoise Conservation Strategy

This [Strategy](#) aims to ensure effective management to achieve and/or maintain favourable conservation status for eight of the most commonly found dolphin and porpoise species in UK waters, including harbour porpoise (*Phocoena phocoena*), common dolphin (*Delphinus delphis*), bottlenose dolphin (*Tursiops truncatus*) and minke whale (*Balaenoptera acutorostrata*). The Strategy includes an action to “Continue to develop and implement a UK bycatch mitigation initiative” and “Improve understanding of entanglements and work towards developing strategies to reduce this threat”. The bycatch mitigation initiative seeks to involve the fishing industry in the planning, development and implementation of measures to best monitor and reduce bycatch through the implementation of effective mitigation measures.

### 3.7 UK Plans of Action (POA) for sharks, seabirds and cetacean bycatch

These three POAs, due to be published in 2021, all have similar overarching policy aims to minimise, and where possible, eliminate incidental bycatch. The three POAs aim to develop, adopt and promote effective bycatch mitigation measures, identify high-risk areas, gear and fisheries, and to identify and adopt effective incentives for fisheries to implement bycatch mitigation. These three POAs support various international commitments to which the UK is obligated for sustainable fisheries and an ecosystem’s approach to management.

The three POAs will be implemented and overseen by the [Clean Catch UK National Steering Group](#).

### 3.8 UK Marine Strategy

The objective of the [UK Marine Strategy](#) reflects the UK’s vision for “clean, healthy, safe, productive and biologically diverse ocean and seas”. It helps to deliver key international obligations and commitments to protect and preserve the marine environment under the UN Convention on the Law of the Sea ([UNCLOS](#)), the [UN Sustainable Development Goal](#) 14 (to conserve and sustainably use the ocean, seas and marine resources for sustainable development), the [OSPAR North-East Atlantic Environment Strategy](#) and the [Convention on Biological Diversity](#).

The aim of the Strategy is to “achieve or maintain good environmental status [GES] in the marine environment”. More specifically, there is a GES indicator stating that “The long-term viability of cetacean populations is not threatened by incidental bycatch”. A similar indicator for seabird bycatch is currently being developed.

### 3.9 Convention on Migratory Species (CMS or Bonn Convention)

Parties to the [CMS](#) are required “to take action to avoid any migratory species becoming endangered”, identify “the factors which may be harmful to their conservation status” and to “take action for migratory species with an unfavourable conservation status including “steps to conserve such species and their habitat”. The Convention also requires countries to enter into international agreements for species that have an unfavourable status and which would significantly benefit from international co-operation.

### 3.10 Agreement on the Conservation of Small Cetaceans of the Baltic, Northeast Atlantic, Irish and North Seas (ASCOBANS)

[ASCOBANS](#) is an agreement concluded through CMS which aims to conserve small cetaceans. This means any species of toothed cetacean<sup>3</sup>. This includes species such as the harbour porpoise, common dolphin, white beaked dolphin (*Lagenorhynchus albirostris*), long finned pilot whale (*Globicephala melas*) and killer whale (*Orcinus orca*). The sperm whale (*Physeter macrocephalus*) is not included because it is conserved with the baleen whales<sup>4</sup> through the International Whaling Commission (IWC).

Parties must aim “to minimise (ultimately to reduce to zero) anthropogenic removals (i.e. mortality of small cetaceans due to man’s actions), and in the short-term, to restore and/or maintain biological or management units [that is populations of small cetaceans] to/at 80 per cent or more of the carrying capacity [of the environment]” and “in order to reach this objective, the intermediate precautionary aim is to reduce bycatch to less than 1 per cent of the best available population estimate”.

### 3.11 Bern Convention

Up until 31 January 2020, the UK’s commitments through the [Bern Convention](#) were implemented via the EU [Habitats](#) and [Birds](#) Directives. Subsequently, the commitments of the Bern Convention apply directly to the UK as a signatory. The Bern Convention explicitly requires Parties to prohibit “all forms of deliberate capture and keeping and deliberate killing”, and “the deliberate disturbance of wild fauna”.

### 3.12 International Convention for the Regulation of Whaling

Originally set up to regulate commercial whaling, the [IWC](#) now also covers all aspects of cetacean conservation. Parties to the IWC have commitments through the Global Whale Entanglement Response Network ([GWERN](#)) and the Bycatch Mitigation Initiative ([BMI](#)).

### 3.13 OSPAR Convention

[OSPAR](#) is the Convention by which fifteen Governments of the western coasts and catchments of Europe, together with the European Union, co-operate to protect the marine environment of the Northeast Atlantic. Contracting Parties are required to “take the necessary measures to protect and conserve the ecosystems and the biological diversity of the maritime area, and to restore, where practicable, marine areas which have been adversely affected.”

OSPAR has a [List of Threatened and/or Declining Species](#) which must be protected. This includes species such as the harbour porpoise, Roseate tern (*Sterna dougallii*), black-legged kittiwake (*Rissa tridactyla*), porbeagle, spurdog, thornback ray, common skate, basking shark, leafscale gulper shark (*Centrophorus squamosus*), long snouted seahorse, cod and Allis shad (*Alosa alosa*).

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<sup>3</sup> Odontoceti

<sup>4</sup> Mysticeti refers to the baleen whales - those having a filtering system made up of baleen plates hanging from their upper jaw.

### 3.14 Food and Agriculture Organisation (FAO) Code of Conduct for Responsible Fisheries

This [Code of Conduct](#) outlines that “States should take appropriate measures to minimise”.... “catch of non-target species, both fish and non-fish species, and negative impacts on associated or dependent species, in particular endangered species”.

Where appropriate, such measures may include technical measures related to fish-size, mesh-size or gear, discards, closed seasons and areas and zones reserved for selected fisheries, particularly artisanal fisheries.

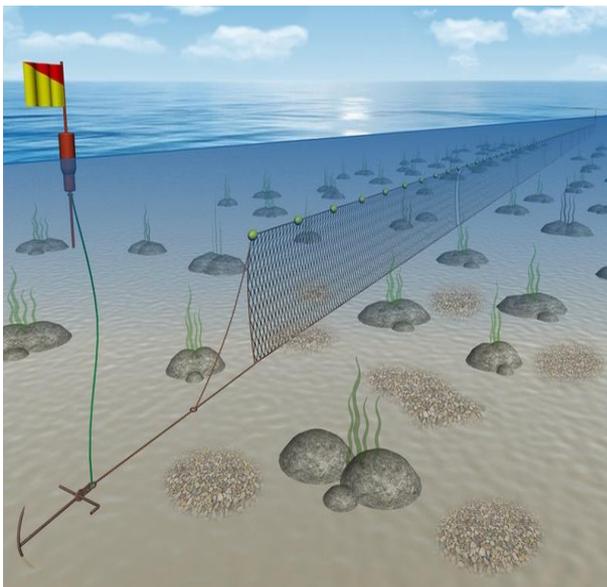
The code also has a management objective “...fisheries management should not only ensure the conservation of target species but also of species belonging to the same ecosystem or associated with or dependent upon the target species.”

Associated with the code is an International Plan of Action for the Conservation and Management of Sharks ([IPOA Sharks](#)), an International Plan of Action for Reducing Incidental Catch of Seabirds in Longline fisheries ([IPOA Seabirds](#)) and [Guidelines to prevent and reduce bycatch of marine mammals in capture fisheries](#).

## 4 Protected species of key concern in UK fisheries

The UK Bycatch Monitoring Programme (BMP) provides dedicated protected species monitoring for some sectors of the UK fleet. Since 1996, over 22,000 fishing operations have been observed, focusing primarily on three main gear types: static nets (e.g. gill, tangle and trammel nets, see Figure 2), pelagic trawls and longlines.

The data are analysed and reported for the UK and also internationally via ICES working groups, which conduct assessments of protected species bycatch levels at population relevant geographic scales. The bycatch of marine mammals and seabirds are generally at much lower rates than those of most elasmobranch species.



**Figure 2: Fleet of gillnets (see [Seafish Gear Database](#))**

The most commonly recorded marine mammal species in the BMP data are harbour porpoise, common dolphin and grey seal (*Halichoerus grypus* in static nets. For seabirds, the most frequently recorded bycatch species are guillemots (in static nets), and fulmars (in longline fisheries). BMP data has also recorded bycatch of several other seabird species in static nets including cormorant (*Phalacrocorax carbo*), gannet (*Morus bassanus*) and razorbill (*Alca torda*).

The BMP commonly records bycatch of the elasmobranchs such as spurdog and common or blue skate. A variety of the rarer elasmobranch species have also been recorded, mostly in static net fisheries. These include blue shark (*Prionace glauca*), porbeagle shark, basking shark and tope, as well as undulate ray (*Raja undulata*), common stringray (*Dasyatis pastinaca*) and

marbled electric ray (*Torpedo marmorata*). Teleost species recorded include Allis shad, long snouted seahorse and sunfish (*Mola mola*) caught in static nets.

Post-mortem investigations from the UK Cetacean Stranding Investigation Programme (CSIP) and Scottish Marine Animal Stranding Scheme (SMASS), as well as interviews with fishers through the [Scottish Entanglement Alliance](#), have provided an indication of the protected species that are affected by creel or pot fisheries. Entanglement of large animals generally occurs in the connecting ropes between the pots and the vertical marker lines. The most commonly recorded species include basking shark, leatherback turtle (Figure 3), minke whale, humpback whale (*Megaptera novaeangliae*), long finned pilot whale and harbour porpoise.



**Figure 3: Entangled leatherback turtle which was released (© Scottish Marine Animal Stranding Scheme)**

Additional to the bycatch occurring during fishing operations, it has also been recorded as a result of abandoned, lost and otherwise discarded fishing gear (ALDFG). These gears can impact marine fauna in two main ways: through entanglement and ingestion. On global basis, all turtle species, approximately half of marine mammal species and a quarter of seabird species have been impacted. Key species affected include humpback whale, minke whale, bottlenose dolphin, grey seal and leatherback turtle. Less information is available for elasmobranchs, although ALDFG is known to affect the leafscale gulper shark (*Centrophorus squamosus*).

## 5 Assessment

The sustainability of seafood production includes consideration and management of the interactions between the fishery and protected species, in order to avoid adverse effects on those populations. However, bycatch rates vary greatly, due to the distribution, type and magnitude of fishing effort, and the distributions and habitat preferences of different protected species.

The assessment of protected species bycatch in fishing operations is typically determined by comparing bycatch estimates against accepted thresholds or reference points, to determine whether the levels of bycatch are of conservation concern. The expectation is that, if exceeded, these thresholds or reference points trigger management action. Such thresholds are important because they ensure a management response is implemented only when it is appropriate and necessary to do so.

Despite the 1995 FAO Code of Conduct for Responsible Fisheries indicating that minimising protected species bycatch was a key global marine conservation goal, there are actually very few agreed thresholds or reference points against which such bycatch can be assessed. Globally, examples include:

- Throughout the European Northeast Atlantic, the ASCOBANS bycatch threshold of 1% of the best population estimate of small cetaceans is used. If bycatch exceeds this threshold, it is likely to lead to population declines. This threshold has also been adopted as an indicator of Good Environmental Status (GES) for UK waters and by OSPAR for the European North Atlantic.
- Permitted/Potential Biological Removals (PBR) calculations, based on population abundance and growth rate, are used to manage marine mammal bycatch (i.e. cetaceans and seals) in the USA. PBR is also used in Scotland to manage anthropogenic impacts on seals. It has also been used for the emergency measures

introduced by the European Commission for common dolphin bycatch in the Bay of Biscay and harbour porpoise bycatch in the Baltic Sea in 2020.

- New Zealand uses Spatially Explicit Fisheries Risk Assessment (SEFRA), a modified version of PBR incorporating uncertainty, to manage seabird bycatch.
- Chile, Australia and USA use bycatch thresholds for longline fisheries associated with a specific number of birds per 1,000 hooks.
- For elasmobranchs, many of which are commercially important, some countries have undertaken risk assessments to ensure adequate protection is introduced. Australia, New Zealand, USA and Canada have management programs for elasmobranch fisheries. Other parts of the world, including Europe, have not implemented such approaches. Instead, prohibitions have been introduced on landing many of the species, with a requirement to return individuals to the sea regardless of whether they are alive or dead. Many of the European commercially important elasmobranchs stocks (mostly ray species) have data limited assessments (See Guide to Data-limited stock assessments (Seafish 2022d) and advice by [ICES](#), but management is by Total Allowable Catch (TAC) of several species combined, limiting the ability to control the exploitation of individual species.

The scale at which these assessments are undertaken is also variable, ranging from individual fisheries or particular gear types up to a regional scale. The development of quantitative thresholds or risk assessment triggers ensure that management action is prioritised only when required, provides evidence of an impact, and allows fisheries managers to evaluate if conservation goals are being met. A good understanding of the risk of protected species bycatch occurring is therefore required to ensure intervention is only applied where and when required.

## 6 Management and mitigation

In many fisheries, protected species bycatch is typically a rare event. Depending on the gear, location and species, an individual fisher may experience protected species bycatch only a



Figure 4: Diving Northern Gannet  
(©Richard Steele)

few times in their entire career at sea, whilst for others, it may occur considerably more frequently. However, these rare events, when collated across the entire fleet may lead to population declines. Consequently, there is a need for ongoing monitoring and recording of protected species bycatch, as well as a thorough understanding of the distribution and abundance of the populations.

Various options are available for the management and mitigation of protected species bycatch. These include effort limitations, gear modification, use of mitigation devices, time and area closures as well as protected areas (Table 1; pages 13-16). Various mitigation assessments have, however indicated the importance of fisheries informed measures i.e. those developed in collaboration with fishers. This is the approach being adopted in the UK, with the aim of voluntary implementation of good practice techniques, in order to reduce bycatch incidents and, when they do occur, to release these individuals alive wherever possible.

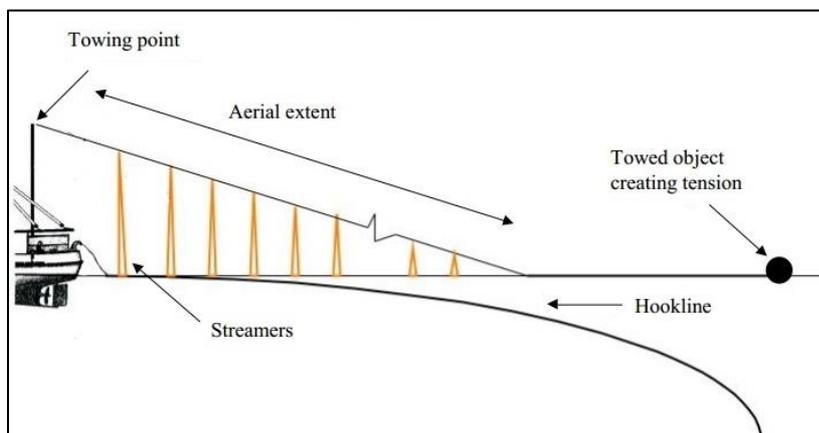
**Table 1: Bycatch effects and possible mitigation approaches by both gear type and species group**

Gear type	Species Group	Effect and possible mitigation approaches
Pelagic seines and other encircling nets	Dolphins and porpoises	<p>Animals are captured inside the net as it is being hauled. Generally, rare as cetaceans can escape over the net or before the net closes. The `back down' procedure is used in some fisheries to enable escapes. In this procedure, the vessel is put in astern (reverse), which elongates the net. Water resistance causes the headline to sink at the opposite end of the net from the boat, providing an escape route.</p> <p>All marine mammal bycatch should be <a href="#">reported</a> within 48 hours of return to port.</p>
	Seabirds	<p>Bycatch is most likely to occur when birds are foraging in and around the net as it is hauled (Figure 5). Some vessels have used 'banging metal on metal' to scare birds out of the danger zone.</p> <p>Live water-logged birds should be rescued, allowed to dry and released once recovered. All bycatch should be recorded in logbook. UK guidelines are being developed.</p>
	Protected elasmobranchs	<p>Although this has not been recorded in UK fisheries, there are <a href="#">best practice guidance</a> for handling and releasing bycaught individuals in tuna fisheries.</p>

**Figure 5: Ring net, sardines and seabirds (© Cornish Sardine Management Association)**

**Table 1: Bycatch effects and possible mitigation approaches by both gear type and species group**

Gear type	Species Group	Effect and possible mitigation approaches
Longlines	Seabirds	<p>Birds pursue bait as the gear is set and are drowned. Lines should be weighted to get the baited hooks rapidly out of the range of feeding seabirds. The use of bird scaring lines (also known as tori lines; Figure 6) can provide a physical deterrent over the area where baited hooks are shot.</p> <p>Limiting fishing periods so that they do not overlap with peak foraging times can be effective. Offal discharge attracts the attention of birds and they congregate around the vessel increasing the risk of interaction with the bait. Offal management is the easiest mitigation to implement. Retain offal on board and avoid discharging when setting or hauling lines.</p> <p>Setting longlines at night is a proven effective mitigation measure. Reducing deck lighting to avoid attracting birds has also been trialled although this may have crew safety implications. If birds are alive, they should be released quickly and with minimal stress to improve chances of survival. All bycatch should be recorded in logbook. UK guidelines are being developed.</p>
	Turtles and protected fish species	<p>The use of in-line circle hooks rather than J-profile hooks has been demonstrated to increase the live-release survivability of turtle and protected fish species. In the case of turtles, the choice of hook bait (e.g. the use of fish rather than squid) and its colouring can also reduce bycatch.</p> <p>Circle hook use is also consistent with the 'International Seafood Sustainability Foundation's' conservation measure on bycatch mitigation '<a href="#">Transactions with Vessels Implementing Best Practices for Sharks and Sea Turtles</a>'. See also <a href="#">best practice guidance</a>.</p>
	Marine mammals	<p>The use of non-stainless steel, weak hooks can be an effective mitigation measure. The hook strength is reduced to a level such that it can still retain the target catch but will enable marine mammals to release themselves by straightening the hook. Reducing the set length and increasing hauling speed may also be beneficial. All marine mammal bycatch should be <a href="#">reported</a> within 48 hours of return to port.</p>



**Figure 6: Bird scarers or 'tori' line, set trailing behind vessel as longlines are set (adapted from Coalition of Legal Toothfish Operators)**

Table 1 (cont). Bycatch effects and possible mitigation approaches by both gear type and species group

Gear type	Species Group	Bycatch effects and possible mitigation approaches
Enmeshing gears: static nets (gill nets, trammel nets and tangle nets) and drift nets	Marine mammals	<p>Whilst in use, animals become entangled in the nets. The most effective mitigation is use of active acoustic devices known as pingers (Figure 7). These are proven effective for harbour porpoise, with results being more variable for other species.</p> <p>In UK and European waters mandatory use of pingers is required on vessels &gt;12m deploying static nets in certain locations; for details see Marine Management Organisation (MMO). For vessels &lt;12m, a marine licence to disturb is required in order to use pingers. These are issued by MMO for English waters, Natural Resources Wales for Welsh Waters, Nature Scotland for Scottish Waters and DAERA for Northern Ireland.</p> <p>Other options for mitigation are being investigated, including the use of tie downs which reduce the profile of the net in the water, altering mesh twine thickness and light-emitting diode (LED) lights and reflectors to alert animals or make the nets more acoustically visible. Spatial measures may be introduced in some marine protected areas (MPAs), e.g. Cardigan Bay SAC.</p> <p>UK guidelines are being developed. If alive, release and return to sea. All marine mammal bycatch should be <a href="#">reported</a> within 48 hours of return to port.</p> <p>The <a href="#">United Nations</a> have banned the use of large scale pelagic drift nets (longer than 2.5 km) in international waters because of their risk to marine life. Smaller scale drift nets, generally used inshore for demersal and small pelagic fish, are permitted.</p>
	Pursuit diving (e.g. cormorants, guillemots and razorbills) and plunge diving (e.g. gannets)	<p>Whilst in use, animals become entangled in the nets. Spatial management of fisheries near breeding colonies is likely.</p> <p>A variety of gear modifications are being investigated. These include reducing soak time and inclusion of coloured panels or high visibility sections in the float line, or the use of LED lights. The effectiveness of these options varies with bird species, location and fishery.</p> <p>If birds are alive, they should be allowed to dry if waterlogged, and released. UK guidelines are being developed.</p>
	Protected fish species	<p>Bycatch is generally a rare event. Where bycatch is a concern, spatial measures (e.g. MPAs) may be used. Incidents must be recorded in logbook and individuals returned to sea. The use of <a href="#">LED lights</a> has been shown to reduce bycatch in some areas.</p>

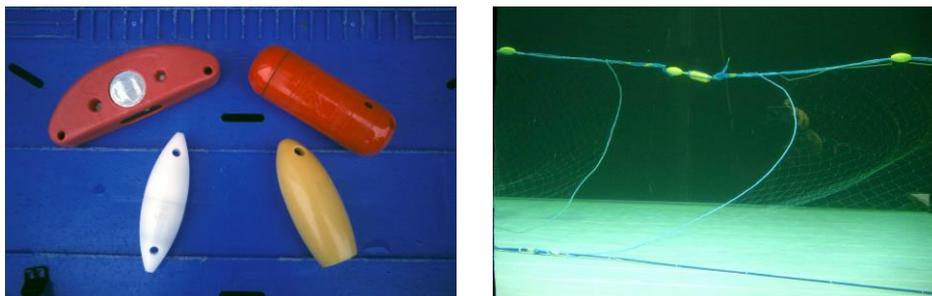
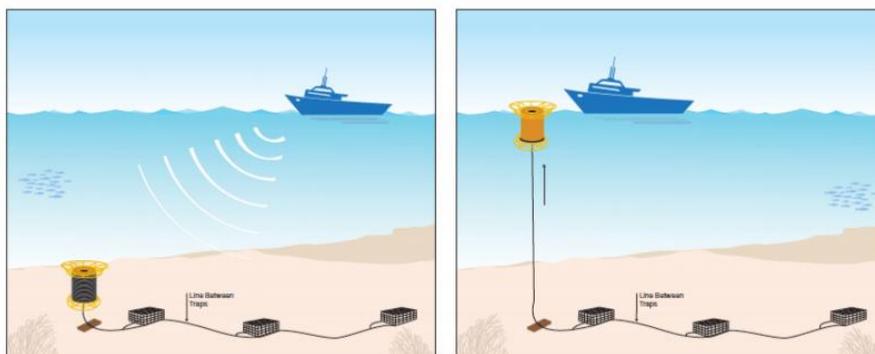


Figure 7: Pingers designed to deter cetaceans from entering static gear. Left shows a variety of pinger types (©Simon Northridge) and right shows pingers being tested in the Seafish Flume Tank.

**Table 1 (cont.) Bycatch effects and possible mitigation approaches by both gear type and species group**

Gear type	Species Group	Effect and possible mitigation approaches
Pot and creel lines	Whales, dolphins and porpoises	Occasionally these species are caught by entanglement in pot and creel lines. The use of tight and weighted lines or ropeless creels are considered to be the most effective mitigation measures. <a href="#">Ropeless creels</a> use an acoustic release system which reduces the number of vertical lines and, therefore, risk of entanglements (Figure 8).  If alive, release individual. See <a href="#">best practice advice</a> for the most effective and safest way to undertake this. All marine mammal bycatch should be <a href="#">reported</a> within 48 hours of return to port.
	Turtles (e.g. leatherback turtle)	Release individual and record in logbook. See <a href="#">best practice advice</a> for the most effective and safest way to undertake this.
	Protected elasmobranchs (e.g. basking shark)	
Trawls	Marine mammals	Marine mammal or seal excluder grids can be fitted. The effectiveness varies by species, location and fishery.  All marine mammal bycatch should be <a href="#">reported</a> within 48 hours of return to port. UK guidelines are being developed.
	Pursuit diving seabirds (e.g. cormorants, guillemots and razorbills)	Bycatch usually occurs during hauling when the cod-end is close to or at the surface.  There is also the potential for birds to strike the trawl warps and hence cause mortality.  Live water-logged birds should be rescued, allowed to dry on deck and released once recovered. All bycatch should be recorded in logbook. UK guidelines are being developed.
All gears	Protected elasmobranchs (e.g. angel shark, white skate, long nose skate)	Return to sea alive as they have a reasonable chance of survival. In future spatial management may be introduced. One such example is the spurdog avoidance programme in which near real-time information on catch rates is supplied to skippers, to enable them to avoid high risk areas. Incidents must be recorded in logbook and individuals returned to sea.



**Figure 8: Example of a ropeless creel system using an acoustic trigger**  
 © Anderson Cabot Center for Ocean Life

Table 1 (cont). Bycatch effects and possible mitigation approaches by both gear type and species group

Gear type	Species Group	Bycatch effects and possible mitigation approaches
Abandoned, Lost or otherwise Discarded Fishing Gear (ALDFG)	All species	<p>Although the magnitude and impact of ALDFG is not easily quantified or validated, the international community has recognised that the problems it creates are significant enough to warrant action.</p> <p>Measures taken can range from avoiding the occurrence of ALDFG in the environment (preventative measures) through to reducing and removing ALDFG (mitigation).</p> <p>Preventative measures include:</p> <ul style="list-style-type: none"> <li>• Scheduled net and rope maintenance: helps minimise the loss of fishing gears;</li> <li>• Gear Marking: The FAO Code states that “<i>fishing gear should be marked in accordance with national legislation in order that the owner of the gear can be identified</i>”;</li> <li>• Global Positioning System (GPS) and other technology: the increasing use of GPS and sea-bed mapping technology by fishing vessels helps reduce initial loss and improves the location and subsequent recovery of lost gear;</li> <li>• Onshore collection/reception and/or payment for old/retrieved gear;</li> <li>• Effort management through soak time and gear use limits; and</li> <li>• Spatial management (zoning schemes) can prevent conflict between different gears and with other marine users which leads to ALDFG.</li> </ul> <p>Mitigation measures include:</p> <ul style="list-style-type: none"> <li>• Better reporting of gear loss. Vessels over 400 gross tonnage are required by MARPOL to have a garbage management plan and to record the dumping or loss of fishing gear as well as returning gear to reception facilities;</li> <li>• Gear recovery programmes such as ‘<a href="#">Fishing for Litter</a>’; and</li> <li>• Potential for a reduction in so-called ‘ghost gear’ catches through the use of biodegradable nets and pots. This has not been adequately trialled and has drawn industry health and safety concerns on the potential for equipment failure.</li> </ul>

## 5 Other guides in this series

These Guides are designed to enable understanding without the need for previous training or expertise in fisheries science. Concepts are presented graphically and in words and the key elements are explained in the summaries.

The full list of Guides is given below, with the date and letter used for cross reference within this document

Seafish (2022a)  
Guide to Fisheries Management  
SR741 ISBN 978-1-911073-47-5

Seafish (2022b)  
Guide to Fish Stock assessment and ICES reference points  
SR742 ISBN 978-1-911073-48-2

Seafish (2022c)  
Guide to Fishing at Maximum Sustainable Yield  
SR743 ISBN 978-1-911073-49-9

Seafish (2022d)  
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SR744 ISBN 978-1-911073-50-5

Seafish (2022e)  
Guide to Sustainable and Responsible Sourcing  
SR752 ISBN 978-1-911073-58-1

Seafish (2022f)  
Guide to Illegal, Unreported or Unregulated (IUU) Fishing  
SR753 ISBN 978-1-911073-59-8

Seafish (2022g)  
Guide to Marine Protected Areas (MPAs)  
SR754 ISBN 978-1-911073-60-4

Seafish (2022h)  
Guide to Protected Species  
SR755 ISBN 978-1-911073-61-1

These can be accessed through the search facility on <https://www.seafish.org/>

The content of these Guides can be used by Seafood business [apprentices](#) and others to study towards two occupational standards units:

- Principles of marine finfish product knowledge – Ref F-602-0617  
<http://seafoodacademy.org/pdfs/f-602-0617.pdf>

- Principles of shellfish, non-marine finfish and marine food products, product knowledge – Ref A-602-0616  
<http://seafoodacademy.org/pdfs/a-602-0616.pdf>

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The Seafish logo features the word "seafish" in a white, lowercase, sans-serif font. Above the letter "i" in "fish", there is a stylized graphic of a fish's tail, composed of several white diamond shapes arranged in a fan-like pattern.

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